Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	
Unlicensed Use of the 6 GHz Band	ET Docket No. 18-295
Expanding Flexible Use in Mid-Band Spectrum between 3.7 and 24 GHz	GN Docket No. 17-183

COMMENTS OF APPLE INC.

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I. INTRODUCTION AND SUMMARY

The Federal Communications Commission initiated this proceeding because consumer demand for additional unlicensed spectrum is "exploding."[1] Apple agrees with the Commission that opening up the 6 GHz band for unlicensed use can help meet this demand. Consequently, Apple and a diverse group of the country's leading technology companies have worked hard over the last two years to identify a path to opening the band to unlicensed operations while protecting incumbent services. Together, these companies have provided a detailed analysis of the proposals in the Notice of Proposed Rulemaking in group comments.[2]

Apple writes separately, however, to underscore that successful rules for 6 GHz unlicensed devices must afford flexibility to enable industry to create innovative consumer products. For example, the nearby 5.725-5.850 MHz U-NII-3 band has produced enormous consumer benefit[3] because the U-NII-3 technical rules accommodate advances in technology and do not include prescriptive mandates or other burdensome limitations. The FCC can provide similar flexibility for 6 GHz unlicensed operations while protecting incumbent operations. To do so, the Commission should take the following actions.

First, the Commission should permit portable 6 GHz unlicensed device operations under the control of Automated Frequency Coordination (AFC) systems. Portable operations that do not rely on fixed access points, including mobile hotspots and applications such as local video

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1 *Unlicensed Use of the 6 GHz Band*, Notice of Proposed Rulemaking, FCC No. 18-147, ET Docket No. 18-295, GN Docket No. 17-183, ¶¶ 3–7 (rel. Oct. 24, 2018) ("NPRM").

2 *See generally* Comments of Apple Inc., Broadcom Inc., Cisco Systems, Inc., Facebook, Inc. Google LLC, Hewlett Packard Enterprise, Intel Corporation, Marvell Semiconductor, Inc., Microsoft Corporation, Qualcomm Incorporated, and Ruckus Networks, an ARRIS Company, ET Docket No. 18-295, GN Docket No. 17-183 (filed Feb. 15, 2019) ("RLAN Group Comments").

3 *See* NPRM ¶ 3.

and audio distribution, are one of the primary reasons consumers use unlicensed spectrum. The Commission should permit portable 6 GHz operations in the U-NII-5 and U-NII-7 bands under the control of AFC systems, which can determine channel availability for multiple locations to identify areas where 6 GHz devices can operate, thereby providing the same level of protection to incumbents as fixed access points under AFC system control.

Second, the Commission should enable 6 GHz devices to operate inside vehicles. Wireless connectivity now plays an increasingly important role inside vehicles, making consumers' trips more productive and enjoyable. Conversely, technologies that stop working when consumers are in transit will be disruptive to consumers and far less successful. For automobiles, the Commission's rules should permit the industry to create solutions that rely on AFC systems, which can and will protect incumbent services in this context. In addition, the FCC should allow unlicensed operations within aircraft, where the fuselage will provide substantial signal attenuation and protect incumbents from low-power 6 GHz operations inside cabins. The Commission should also recognize that a class of short-range, very-low-power 14 dBm 6 GHz devices can operate without causing harmful interference to incumbent operations under any reasonable deployment scenario, including in vehicles.

Third, while the Commission should establish AFC rules that protect incumbents, it should avoid unnecessary and over-regulatory requirements that would suppress investment and discourage innovation. The Commission's rules should ensure a robust and reliable AFC. But they should not dictate the details of AFC implementation. The Commission also should not attempt to predict in advance which AFC system business model(s) will succeed in the band by creating rules that would permit companies to deploy only one type of AFC system.

Fourth, the Commission should not create rules that force 6 GHz devices to adopt a persistent unique hardware identifier, and to disclose that identifier to third parties. Such requirements are unnecessary, unsupported by either the incumbents or 6 GHz unlicensed proponents, and would create substantial privacy risks. Moreover, requiring devices to periodically transmit persistent unique hardware identifiers could result in significant performance penalties for latency-sensitive two-way communications, including voice and video calls, digital hearing aid features, and interactions with video game controllers and other peripherals.

Fifth, the Commission should provide flexibility for consumers to access any necessary "information to user" statements electronically. Electronic provision of such information is consistent with the Commission's existing requirements for similar statements, as well as Congressional intent in the E-LABEL Act.[4]

Finally, Apple fully supports the other recommendations set forth in the RLAN Group comments, including (1) adopting the FCC's proposal to open the full 6 GHz band to unlicensed operations rather than displacing existing incumbents to create a new licensed service in any part of the band, (2) allowing low-power indoor devices to access each of the four 6 GHz sub-bands, and (3) permitting a class of very-low-power devices to operate both indoors and outdoors throughout the band to enable applications that rely on short-range communications.

[4] *See* E-LABEL Act § 3, 47 U.S.C. § 622(b) (2014).

II. THE COMMISSION SHOULD PERMIT PORTABLE 6 GHZ UNLICENSED DEVICE OPERATIONS UNDER AFC CONTROL.

As the NPRM recognizes, unlicensed networks are an essential part of the wireless broadband ecosystem.[5] This is the case, in part, because of the "many applications where unlicensed devices . . . transmit without being associated with [a fixed] access point," including "mobile hotspots that provide Wi-Fi connections to other nearby devices," as well as numerous "unlicensed wireless applications that are unrelated to accessing the Internet such as in-home distributions of video, real-time gaming, and high fidelity audio."[6] Consistent with the Commission's goal of avoiding any regulatory restrictions that "unnecessarily limit the potential uses of unlicensed devices," it should expressly permit 6 GHz devices to operate in mobile and transportable modes in the U-NII-5 and U-NII-7 bands using AFC systems.[7]

Under the Commission's proposed framework, standard-power access points in the U-NII-5 and U-NII-7 bands will rely on AFC systems to determine whether they can transmit at a given frequency and location based on the presence of fixed service incumbents in the area.[8] These same systems can enable portable operations while protecting fixed service incumbents. For example, the Commission's 600 MHz rules permit unlicensed devices "to load channel availability information for multiple locations to define a geographic area in which the device can operate."[9] The Commission should adopt a similar approach for 6 GHz operations.

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5 NPRM ¶¶ 3–6.

6 *Id.* ¶ 76.

7 *See id*. (seeking comment on mobile and transportable operations).

8 *See id.* ¶ 25.

9 *Id.* ¶ 76.

As set forth in greater detail in the RLAN Group comments, devices can interface with AFC systems to determine which channels are available at their locations even when they are not stationary.[10] This is because AFC systems can account for variables such as devices' velocity and geolocation accuracy to determine whether a device will be in an area where an AFC system can authorize transmissions.[11] Indeed, as we explain below, there are several ways in which AFC systems could provide channel availability to access points when they are in motion. Moreover, these systems can account for uncertainty in the device's location information by assuming worst case scenarios (e.g. the greatest distance the device could possibly travel) based on the device's reported information.[12] Thus, by taking into account location and velocity information—and adopting rules that make it clear that a device must stop transmitting if it leaves an approved geographic area—portable operations using AFC systems will provide the same protection to incumbent operations as fixed 6 GHz access points.

III. THE COMMISSION SHOULD PERMIT CONSUMERS TO USE 6 GHZ UNLICENSED DEVICES INSIDE VEHICLES.

Wireless connectivity now plays an increasingly important role inside vehicles, making consumers' trips more productive and enjoyable. Conversely, technologies that stop working when consumers are in transit will cause consumer disruption and be far less successful. Fortunately, 6 GHz rules can ensure that in-vehicle operations do not cause harmful interference, so the Commission can safely permit this use case.

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[10] RLAN Group Comments Section III.A.

[11] *Id.* at 52–53.

[12] *Id.* at 51–52.

A. Standard-Power 6 GHz Unlicensed Operations Inside Automobiles Will Protect Incumbent Services.

The Commission should permit standard-power operations inside automobiles. The NPRM asks for comment on how an AFC could assign a list of available frequencies to a standard-power access point when an automobile is moving.[13] Based on our substantial experience with location-sensitive mobile device operations, we believe that AFC systems will succeed in this operation. The Commission can empower an AFC to do so through rules that provide flexibility for industry to implement one of several solutions for standard-power in-vehicle operations, based on the type of device and intended application.

There are several potential ways in which an "AFC system [could] provide and update the list of available frequencies to a standard-power access point while it is in motion" as a vehicle travels through locations where incumbent fixed service operations are and are not present.[14] First, devices today can predict their likely destinations, and can employ map-aware applications that pre-fetch and pre-load AFC system information about incumbent operations along their expected routes. Unlike in other bands, 6 GHz band fixed service operations are stable over short time periods, and pre-fetching data on areas where operation is permitted or prohibited is readily accomplishable by existing technology approaches. Second, an AFC-controlled access point in an automobile could also protect incumbents by using variable-sized geographic areas to determine channel availability based on the operational information the AFC will possess. For example, an access point could query an AFC system about frequencies that would be available throughout a 50 km area, and confine its operations to acceptable frequencies when it is traveling within that area. This would be overprotective as it would cause the access

[13] *See* NPRM ¶ 84.

[14] *See id.*

point not to transmit in situations where there are not incumbent operations, but for some devices or applications this would be justifiable because it would simplify calculations—all without adding any increased risk of harmful interference compared to a fixed access point. Third, an access point could communicate with a remote AFC system in near-real time, acquiring constantly updated channel availability over non-6-GHz frequencies as it moves. This is feasible today because of the availability of strong network connectivity provided over other frequency bands, such as an LTE modem built-in to an automobile.

Each of these solutions depends on a 6 GHz access point's ability to know its location as it moves so that it can determine whether it is within an area for which an AFC system would permit operations. However, this is exactly the approach that the Commission has previously permitted for portable operations in the 600 MHz and 3.5 GHz bands, which also rely on databases to protect incumbents.[15] The Commission can rely on a similar approach in the far less complicated 6 GHz band for unlicensed access point operations in the U-NII-5 and U-NII-7 bands—where incumbent operations are always in fixed, known locations.

B. Very-Low-Power 14 dBm 6 GHz Unlicensed Operations Inside Automobiles Will Not Cause Harmful Interference to Incumbent Services.

As the RLAN Group comments explain in detail, the Commission should authorize a category of very-low-power 6 GHz devices for indoor and outdoor use without AFC control.[16] Such devices—which would operate at a maximum transmit power of only 14 dBm EIRP—would enable important applications at short ranges, including communications between devices and accessories such as headphones, hearing aids, watches, game controllers, and other

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[15] *See* 47 C.F.R. §§ 15.711(d); 96.39(a)(3).

[16] *See* RLAN Group Comments Section II.B.

peripherals. Due to these devices' very low transmit power, they would be extremely unlikely to cause harmful interference to incumbent operations even when operating outdoors.

Accordingly, the Commission should also expressly permit such uses inside vehicles, where environments characterized by even greater attenuation would render these already faint signals practically imperceptible to incumbent licensees. As described in the RLAN Group comments, the average interference to a fixed service receiver from a very-low-power 6 GHz transmitter operating outside would be less than -30 dB I/N.[17] Operations inside automobiles reduce even further this already negligible risk of harmful interference.

As the NPRM recognizes, point-to-point fixed incumbents generally "use highly directional antennas where the energy transmitted and received is concentrated in a particular direction."[18] An unlicensed device is only positioned to even potentially cause harmful interference if it is placed so it could introduce unwanted signals into the beam of the receive antenna.[19] For example, a common twelve-foot UHX antenna exhibits nearly 30 dB less than peak gain for unwanted signals that are only two degrees off boresight.[20]

Operation in automobiles makes such placement very unlikely. Therefore, in addition to their extremely low power, the substantial difference in heights between fixed service deployments and 6 GHz unlicensed operation in automobiles will further ensure that very-low-power operations do not cause harmful interference with fixed incumbents. 6 GHz unlicensed

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17 *Id*. at 37.

18 NPRM ¶ 37.

19 *See id.* (tentatively concluding that "unlicensed devices need only be excluded from a zone determined by the fixed service receive antenna pattern and the EIRP of the unlicensed device").

20 RLAN Group Comments at 20.

devices in automobiles will always be located where the automobile is located—approximately a meter above ground level. Fixed point-to-point operations, in contrast, are typically mounted on antennas or other structures many meters above the ground. Indeed, a survey of the Commission's ULS database shows that the average height of a 6 GHz fixed service deployment is 43 meters, and 80% are higher than 18 meters.[21] Thus, very-low-power transmitters in automobiles will virtually always be at least tens of degrees off-axis from fixed service receive antennas when they are nearby.[22]

Finally, automobiles themselves provide signal attenuation that will dramatically reduce the already faint signals of a very-low-power transmitter. Transmissions from inside a vehicle are likely to be subject to at least 10 dB of additional signal loss.[23] Thus, operations in automobiles would result in approximately a 90% reduction to the transmit power of a very-low-power signal that already presents no real-world risk of interference to fixed incumbents. Considered together, the extremely low power of 14 dBm devices, the positional mismatch between automobiles and fixed service receivers (especially along the Z-axis), and the extra attenuation afforded by automobiles mean that this use case presents no real-world harmful interference risk to fixed service operations.

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21 *Id.*

22 As explained in the RLAN Group Comments, an unlicensed device operating in a typical two-story home would need to be more than a kilometer away from a fixed service receive antenna with an average height of 43 meters in order to be within two degrees of the boresight of that antenna. At this distance, signal propagation would result in over 120 dB of signal loss even assuming line-of-sight conditions. *Id.* at 20–21.

23 *See id.*, Appendix E: Building and Vehicle Attenuation at E5–E6 ("RLAN Group Appendix E").

C. The Commission Should Not Restrict Low-Power 6 GHz Unlicensed Operations Within Aircraft Cabins.

The Commission should permit consumers to operate low-power 6 GHz devices inside aircraft cabins. Operation on board aircraft is an important use case for consumers, and these operations do not risk causing harmful interference to incumbents. The Commission seeks comment on whether "airborne operation [of 6 GHz devices] can cause interference over a wide area" because of the ability for signals to propagate over longer line-of-sight distances when transmitters are airborne.[24] For this reason, Apple does not object to prohibiting unlicensed use of the 6 GHz band for transmissions from aircraft to ground stations, nor to using the 6 GHz band for remote piloting of unmanned aerial vehicles. However, this concern does not apply to the operation of 6 GHz devices *inside aircraft*—and the Commission should not restrict consumers' use of low-power (and, by extension, very-low-power) 6 GHz operations within an aircraft cabin.

As the Commission has recognized, low-power indoor uses can co-exist with incumbents "in part due to significant building attenuation . . . ."[25] The NPRM posits that attenuation from an "aircraft is likely to be significantly less than from a building."[26] While that may be true for a transmitting antenna mounted on the *exterior* of an aircraft, this would certainly not be the case for a low-power 6 GHz consumer device operating exclusively inside a modern commercial aircraft cabin. For example, in Europe, CEPT considers aircraft cabin operations in the adjacent 5 GHz band to be comparable to indoor operations "due to the strong attenuation offered by the

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[24] NPRM ¶ 85.

[25] *Id.* ¶ 61.

[26] *Id.* ¶ 84.

aircraft, their operational conditions, and taking account of the fact that the installation and use of RLAN equipment inside an aircraft is regulated by administrations due to the specific certification required from the relevant aviation authorities."[27] Thus, as set forth in greater detail in Appendix E accompanying the RLAN Group comments, interference from 6 GHz unlicensed devices used on board aircraft to incumbent operations is highly unlikely.[28]

Because the risk of harmful interference to licensed incumbents from low-power 6 GHz transmissions inside aircraft cabins is negligible due to these attenuation factors, the decision of whether to permit these devices to operate inside cabins should be made by aircraft operators under the FAA's regulatory framework for assessing transmitting portable electronic devices that do not operate in the cellular bands—but the Commission should not prohibit them out of interference concerns.[29]

IV. THE COMMISSION SHOULD ADOPT AFC REQUIREMENTS THAT PROTECT INCUMBENTS WHILE PRESERVING THE FREEDOM TO INNOVATE.

Under the proposed rules, standard-power 6 GHz devices must determine available frequencies at a given location from an AFC system.[30] The NPRM seeks comment on the capabilities it should require for AFC systems.[31] Although the Commission should establish robust foundational requirements that will ensure protection for incumbents, it should avoid

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[27] ECC Decision on the harmonized use of the 5 GHz frequency bands for the implementation of Wireless Access Systems including Radio Local Area Networks (WAS/RLANs), ECC/DEC/(04)08, at 3 n.2 (July 9, 2004).

[28] RLAN Group Appendix E at E6.

[29] *See* Federal Aviation Administration, *Use of Portable Electronic Devices Aboard Aircraft*, AC 91.21-1D (Oct. 27, 2017).

[30] NPRM ¶ 25.

[31] *Id.*

unnecessary and over-regulated constraints that will suppress investment and discourage innovation in the 6 GHz band.

As the NPRM recognizes, an AFC system should be "a simple database that is easy to implement."[32] Although the NPRM references the 600 MHz and 3.5 GHz databases, the operating environment in the 6 GHz band is far different—and simpler—compared to those bands. Most significantly, 6 GHz incumbents in the U-NII-5 and U-NII-7 bands operate exclusively at known, fixed locations, and information about these incumbents is already available in existing FCC databases.[33] The Commission should account for this fact and avoid any AFC system requirement that is not needed to provide reasonable protection to the particular incumbents in the 6 GHz band. Unnecessary requirements for AFC systems will discourage investment in the 6 GHz band and, consequently, deployment of broadband and other innovative uses.

For example, there is no need for AFC systems to (1) coordinate or be interoperable with one another,[34] or (2) report frequency availability based on particular channelization schemes.[35] Furthermore, as discussed in greater detail below, the Commission should not (3) impose device registration requirements.

The Commission also should not attempt to predict in advance which AFC system business model(s) will succeed in the band.[36] As the NPRM recognizes, an AFC system could

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[32] *Id.*

[33] *See id.* ¶ 29.

[34] *See id.* ¶ 33 (seeking comment on AFC system operator functions).

[35] *See id.* ¶ 26.

[36] *See id.* ¶ 25 (seeking comment on which AFC system model to implement).

potentially be based on a centralized model where relevant information about permissible frequencies of operation resides on a single server, or in the cloud.[37] Alternatively, an AFC system could implement a "de-centralized model where the standard-power access point maintains a local database and performs the necessary computations to determine which frequencies are permissible."[38] The FCC's rules should provide flexibility for industry to implement either approach.

Finally, because different AFC system models may be appropriate for different use cases, and because those use cases can evolve over time, the Commission should not implement any other requirements that would limit AFC system design decisions. For example, the Commission should not mandate a "single AFC system operator," nor should it require every AFC system to operate with every standard-power 6 GHz device, and vice-versa.[39]

V. THE COMMISSION SHOULD NOT MANDATE TRANSMIT IDENTIFIERS FOR 6 GHZ UNLICENSED DEVICES.

The NPRM seeks comment on whether the Commission should require access points to "transmit identifying information" to an AFC system.[40] It also seeks comment on whether to require 6 GHz devices to transmit device identifying information more generally so incumbents can monitor those transmissions.[41] The Commission should not pursue either of these

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37 *Id.*

38 *Id.*

39 *See id.* ¶ 33 ("[S]hould a manufacturer be allowed to operate an AFC system that serves only devices that it produces?").

40 *Id.* ¶ 27.

41 *Id.* ¶ 87.

regulations. Requiring devices to transmit identifying information is unnecessary, and would create significant performance and privacy concerns.

A. The Commission Should Not Force 6 GHz Devices to Register with AFC Systems.

As the NPRM recognizes, AFC device registration—and therefore the need to transmit identifying information to an AFC—is unnecessary. This is because a device that relies on a centralized AFC system need only "provide only its location data and the AFC system would provide it with the list of permissible channels for that location."[42] Devices that use a local AFC system likewise would not need to transmit any identifying information because, "[u]nder a decentralized system architecture, . . . the device only needs periodic updates of the local fixed service operating environment."[43] A persistent unique hardware device identifier is not needed to protect against harmful interference under the FCC's proposals.

The Commission should not require AFC systems to use persistent unique hardware identifiers to log access point activities in order to assess potential sources of harmful interference.[44] First, such a requirement would make it impossible to implement an AFC system using a decentralized model, such as a standalone access point. As described above, eliminating this option would significantly reduce industry flexibility to determine the appropriate AFC business model(s) for current and future uses of the 6 GHz band, dramatically decreasing the band's utility. Moreover, from Apple's perspective, transmission of a persistent unique hardware identifier with location information to an AFC system would necessarily require user

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42 *Id.* ¶ 27.

43 *Id.*

44 *See id.* ¶ 89.

consent, and thus may diminish the value of the 6 GHz band because some percentage of users will not consent.

Indeed, creating a detailed log of uniquely-identified 6 GHz devices associated with times and geographic locations would be fundamentally inconsistent with users' privacy expectations when they access unlicensed networks. For example, Apple devices give users significant power over how any application uses their location data.[45] It would be challenging for Apple devices to utilize the 6 GHz band if the FCC forced access points to submit information that undermined consumer control and resulted in a detailed record of the device's current and historic location data whenever the device accessed an AFC system.

B. The Commission Should Not Require 6 GHz Devices to Transmit an Identifier That Third Parties Can Permanently Associate with the Device.

A requirement that devices periodically transmit identifying information for any third party to receive would both impose significant costs and introduce privacy risk with no offsetting benefit. For example, the Fixed Wireless Communications Coalition (FWCC) states that such transmit ID requirements "are of no use" to fixed incumbents because their existing receivers cannot demodulate a 6 GHz transmit ID signal.[46]

Imposing such a requirement would also make it far more challenging for companies to use the 6 GHz band for innovative applications that benefit consumers, and without risking user privacy. Requiring a 6 GHz device to periodically transmit a persistent unique hardware identifier that can be decoded by other receivers in the area necessarily would mean that the

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[45] *See* Apple Inc., *Privacy: Manage Your Privacy*, https://www.apple.com/privacy/manage-your-privacy/ (last visited Feb. 15, 2019).

[46] Letter from Mitchell Lazarus & Cheng-Yi Liu, Counsel, Fixed Wireless Communications Coalition, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 17-183, at 16 (filed June 8, 2016).

6 GHz device cannot transmit other desired information during that time slot. Some non-latency-sensitive applications, such as media streaming, might be able to address this restriction by buffering information data. However, a requirement that 6 GHz devices periodically stop transmitting desired information could significantly impact numerous applications that rely on communications with minimal delay to convey information. For example, real-time applications such as two-way voice and video calls, modern digital hearing aid features, online gaming, messaging applications, and virtual meeting spaces often depend on low latency connections for effective communication.

The privacy implications of an FCC requirement to transmit such an identifier is even more problematic from Apple's perspective, as it would allow for passive monitoring of users. Apple has worked hard to create devices and services that improve user experiences while protecting their information. Core to this approach has been to limit third parties' access to persistent unique hardware identifiers, which undermine user privacy by enabling long-term passive tracking of a user by third parties and denying users the ability to reset their identity with those third parties. Apple's privacy efforts include unlicensed spectrum uses, where, in response to the rise of passive tracking of users through their Wi-Fi MAC addresses, iOS introduced Wi-Fi MAC address randomization.[47]

Requiring a user's device to transmit a unique identifier that could be decoded by any technically capable receiver would create substantial privacy risks, including allowing unknown third parties to track the device wherever it goes. Moreover, in many cases, this device information could be easily combined with other information to link the device ID to a user's

[47] *See* Apple Inc, *iOS Security* 41 (Nov. 2018), *available at* https://www.apple.com/business/site/docs/iOS_Security_Guide.pdf.

real-world identity. This would be inconsistent with Apple device users' reasonable privacy expectations when they access unlicensed spectrum networks as well as their fundamental right to privacy.

VI. THE COMMISSION SHOULD PROVIDE FLEXIBILITY FOR CONSUMERS TO ACCESS 6 GHZ INFORMATION REQUIREMENTS ELECTRONICALLY.

The NPRM asks whether the Commission's rules should require 6 GHz device manufacturers to inform consumers of any specific operational requirements and, if so, how manufacturers should convey this information.[48] The Commission should permit manufacturers to provide any "information to user" requirements for 6 GHz devices electronically, just as it does for unlicensed devices that operate in other spectrum bands.

The Commission's rules generally contemplate that Part 15 user information statements may appear in the user manual.[49] This is the case even for Part 15 devices operating under rules with indoor use provisions, where the rules permit manufacturers to inform the user of this limitation by placing caution language in the user manual rather than on the device.[50] Similarly, guidance issued by the FCC Office of Engineering and Technology permits information related to RF exposure—including instructions on using device accessories that users must follow to ensure RF exposure compliance—to be provided in the user manual.[51]

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48 NPRM ¶ 91.

49 *Id.* ¶ 91 n.176; 47 C.F.R. § 15.21. *See also, e.g.*, 47 C.F.R. §§ 15.27; 15.105.

50 *See, e.g.*, 47 C.F.R. §§ 15.257(a)(4); 15.517(f).

51 FCC Office of Engineering and Technology, Laboratory Division, *General Guidelines for Labeling and Other Information Required to be Provided to Users*, KDB Publication No. 784748 D01, Appendix A at 9 (rel. July 2, 2018).

As the NPRM observes, moreover, the user manual accompanying a Part 15 device "may be provided electronically."[52] Indeed, as the Commission has previously recognized, there are several advantages to doing so. These include providing manufacturers with flexibility in how to convey information to users, enabling users to take advantage of accessibility features available when accessing digital files, and avoiding the waste of unnecessary mass production and distribution of printed materials.[53] The Commission therefore should make clear that any informational requirements it adopts for 6 GHz access points can be provided via electronic user manuals.

Finally, given the similarity of any potential 6 GHz informational statements to statements that the Commission already permits in user manuals in other contexts, specific labeling requirements for 6 GHz devices are unnecessary. If the Commission does implement a labeling requirement, however, it should ensure that this requirement is at least as flexible as the existing Part 15 labeling obligations.[54]

First, the Commission should make clear that any radiofrequency devices that can take advantage of its electronic labeling rule—i.e., those with integrated screens or that are designed to operate only in conjunction with a screen—may provide 6 GHz label information electronically.[55] As Congress contemplated in the E-LABEL Act, eligible devices should have "the option to use electronic labeling for the equipment in place of affixing physical labels to the

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[52] NPRM ¶ 91 n.176.

[53] *See Amendment of Parts 2 and 15 of the Commission's Rules to Deregulate the Equipment Authorization Requirements for Digital Devices*, Memorandum Opinion and Order, 18 FCC Rcd.14,741, 14,758 ¶ 36 (2003).

[54] *See* 47 C.F.R. § 15.19(a)(3).

[55] 47 C.F.R. § 2.935.

equipment."[56] Consistent with this requirement, the Commission's electronic labeling "rule [has] broad applicability . . . ."[57] This is why the rule generally permits eligible devices to display information electronically, including "any warning statements . . . that the Commission's rules would otherwise require to be shown on a physical label attached to the device."[58]

In addition, any labeling requirement should also provide flexibility for access point devices that cannot take advantage of electronic labeling. For example, the existing Section 15.19 labeling rule provides that, when "it is impracticable to label [the device] in a font that is four-point or larger, and the device does not have a display that can show electronic labeling, then the [required] information . . . shall be placed in the user manual" and on device packaging or a removable device label.[59] Any 6 GHz labeling requirement should include a similar provision.

VII. CONCLUSION

The 6 GHz band can play a vital role in addressing rapidly expanding consumer demand for unlicensed spectrum. If the Commission's rules are to be successful, however, they must be sufficiently flexible to enable companies to innovate. Accordingly, as the Commission crafts rules for 6 GHz unlicensed operations, it should ensure that:

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56 E-LABEL Act § 3, 47 U.S.C. § 622(b) (2014).

57 *Amendment of Parts 0, 1, 2, 15 and 18 of the Commission's Rules regarding Authorization of Radiofrequency Equipment*, First Report and Order, 32 FCC Rcd. 8746, 8764 ¶ 43 (2017). ("Equipment Authorization Report and Order").

58 47 C.F.R. § 2.935(a). To date, the only exceptions the Commission has made have been for "safety-of-life" warnings such as those associated with medical equipment and emergency locator beacons. Equipment Authorization Report and Order ¶ 42.

59 47 C.F.R. § 15.19(a)(5).

(1) *Consumers can use their portable devices in the 6 GHz band under the control of AFC systems*. Portable operations are a vital use case for unlicensed consumer devices, and AFC systems can enable these uses while protecting incumbent operations.

(2) *Consumers can use their 6 GHz devices inside vehicles*. AFC systems can enable standard power operations inside automobiles, and the fuselage of commercial aircraft will protect incumbents from low-power operations inside aircraft. In addition, because very-low-power devices will not cause harmful interference to incumbents under any reasonable deployment scenario, the Commission should permit them in vehicles as well.

(3) *AFC system requirements do not include unnecessary and over-regulatory provisions*. The Commission's rules should ensure strong protection for incumbents, but should not impose unneeded or technologically specific constraints that will suppress investment and discourage innovation.

(4) *Commission rules do not unintentionally undermine consumer privacy by requiring persistent unique hardware identifiers*. Such rules would also create significant performance concerns.

(5) *Consumers have flexibility to access 6 GHz information requirements electronically*, consistent with the Commission's existing requirements for similar statements as well as Congressional intent in the E-LABEL Act.

By adopting the NPRM's proposals with the adjustments described above, the Commission will provide innovators with the unlicensed spectrum resources they need at a critical time—existing bands will not support continued growth. This action will also continue the FCC's long history of leadership in spectrum policy, spurring other countries to open the band. We therefore encourage the Commission to move quickly to adopt a final order.

Respectfully submitted,

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